ENHANCEMENT OF TEACHING-LEARNING PROCESS THROUGH MULTIMEDIA TECHNOLOGY

By

R. CHARLES

Research Scholar, St. Christopher's College of Education, Vepery, Chennai.

ABSTRACT

The Indian educational system has to meet the challenges of knowledge explosion and its requirement of increased enrolment in higher education. Computer and technology plays a pre-dominant role to meet out its challenges. Recent innovative Educational approach recommends self and sensory oriented instruction. Computer based multimedia is a tool rich enough to enhance the knowledge and skills. In the present scientific and technological age, the conventional teaching methods are not sufficient to arouse interest among the students and do not meet up to the intellectual, psychological and emotional needs of the students. A teacher being a pivot in the process of teaching and learning, knowledge of ICT and skills to use ICT in teaching-learning has gained immense importance for today's teacher. With the advent and popularisation of internet and worldwide -web (www) the world has become higher cohesive and interconnected in nature. This paper is an attempt to highlight the role of Multimedia technology in teaching learning process.

Keywords: Multimedia, ICT, Teaching - Learning.

INTRODUCTION

The National policy on Education of Government of India MHRD, (1986) and the International Commission on Education for the 21st century Delors,(1996) have observed that teachers are the centre of improvement in quality and hence professional development of teachers is viewed as the most crucial area of concern. At present, India is in a stage of transition involving social, cultural and economic changes. As observed by Pandey, (1999) "India is gradually moving from tradition to modernity, from industrial to information society and from welfare state to liberal market economy". These changes have strong implications in education and have put tremendous pressure on teachers. As an offshoot of this and as a consequence, teacher's role has changed from that of a mere transmitter of information to that of a facilitator of learning.

Educational Technology

Educational technology is made up of two words Education and Technology. Education is an act or process of acquiring and imparting knowledge, skills and attitudes. Technology is a science of techniques and methods of doing or getting things done related to any art, science or profession.

Technology in education refers to the use of various equipments, materials and machines for educational purposes. It involves electronic devices like projectors, films, radio, television, tape recorder, teaching machine, computers and projectors (OHP, LCD) for individualized and group learning.

Scope of Educational technology

Educational technology aims at improving the quality of human learning. Educational technology is a field involved in applying a complex integrated process to analyze and solve problems concerned with learning. The scope of Educational technology is unlimited as it tries to reach out to more and more people involved in teaching learning process. It enables us to develop interactive instruction services, creating a sound learning environment with more information resources utilizing new communication devices to reduce the burden of teachers by providing new teaching-learning materials.

Teaching Aids

The teaching–learning process essentially involves the process of transfer of learning which calls for a strong medium of communication. Hence, a teacher needs to employ as many teaching aids as possible for effective

teaching. The essential qualities of teaching aids are listed below:

- *Relevancy:* Should be directly related.
- *Accuracy:* Should give accurate picture.
- *Comprehensibility:* Should make learning simpler.
- *Interesting:* Must stimulate learner interest.
- *Cost effective:* Must be effective and cheap.
- *Availability:* Should be easily available.
- *Transportability:* Should be compact and portable.
- *Appropriateness:* Suitable to age and intelligence.

Vanaja,(2005) has stated that our sense organs are the gateways to acquire knowledge. It has been proved by research that we learn:

1 % through gustatory (taste)

1.5 % through tactile (touch)

3.5 % through olfactory (smell)

11.0 % through auditory (hearing)

83.0 % through visual (sight)

Hence, educational technology has identified its domineering role in teaching learning process, which aims at solving persisting problems of teaching and learning. Education as a system, which has some objective planned for the process. For the realisation of which a variety of strategies, techniques and teaching aids have been designed and devised by Educational technologists especially computer aided learning improvises the efficiency by facilitating the learners in learning at their convenience. The multimedia technology is one of the emerging technologies in our country, which has brought a new dimension in the conventional method of teaching and has been well acclaimed by the learners.

Multimedia Approach

Multimedia approach is an innovation that aims at improving the teaching-learning process. Multimedia approach uses a number of media, devices, and techniques in the teaching learning process. It aims at providing meaningful learning experiences through a mixture of media in order to achieve predetermined learning objectives.

Definition

Najjar, (1996) has stated that Multimedia involves the use of text, graphics, animation, pictures, video and sound to present information. Since these media can now be integrated using a computer, there has been a virtual explosion of computer based Multimedia instructional applications.

Reddi, & Mishra, (2003) have defined Multimedia as an integration of multiple media elements (audio, video, graphics, text, animation etc) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media element can provide individually.

Relationship between Hypertext, Hypermedia and Multimedia

The term hypertext was coined by Nelson, (1965) for the purpose of describing documents created in a computer, reflecting a non-linear structure of a conception, as opposed to the linear form of books, movies and speech. Hypertext is the non-linear text, which contains connections called as Hyperlinks, Hot words or Hotlinks to other documents. In short, Hypertext is a text, which is organised nonlinearly in a computer-based system with links and nodes having text, pictures, sound, video, graphics and animation. Hypermedia is a non-textual component added to a hypertext, such as animation, recorded sound and video, and their integration into package. It is an extension of hypertext. Hypermedia in its interactive form is controlled by the user through hypertexts. Hypermedia is the union of Multimedia and hypertext

Kidd, Hutchings, Hall, and Cesnik, (1992) has expressed the relationship between these three in the form of following equation. Hypertext + Multimedia = Hypermedia

As specified in the Computer Dictionary of Microsoft, (2002), if information is textual it is hypertext and if there are certain visual, musical, animation elements then it is hypermedia.

Instructional design through Multimedia

In designing instruction through Multimedia, the choice of media and their application for optimising human learning with reference to the stated instructional objective is the

most important aspect. Hence, it is required to consider the various components that constitute the Instructional design for Multimedia learning system such as objective, content sequence, media options and evaluation options.

Objectives

Specifying the objectives of the Multimedia-learning package is one of the key issues. The objective to be accomplished should be stated in behavioural and measurable terms; they can range from simple to complex and from lower to higher order learning.

Content sequence

The content of any Instructional design is selected based on the stated objectives of learning. The content points have to be sequenced and organised from simple to high level of complexity. While organising the content, it should be ensured that the adequacy of the content facilitates the achievement of the objectives by the learners and based on the methods of individualised instruction through which the content will be disseminated.

Media options

Depending upon the objectives and the content, appropriate means of presenting the content and the media associated are to be decided. Self-learning through individualised instruction with Multimedia incorporates several media like text, audio, video, graphics, animation etc. It is important to match the learning objectives and decide the media to synchronise the design and learning from it. Appropriate mix of media elements / media types related to the content enables the learners with individual differences to accomplish all the instructional objectives.

Evaluation options

One of the key aspects of Instructional design is to evaluate the learner's progress during and after the learning process. The former is formative evaluation and the latter is called as summative evaluation. Both of these can be done using online and offline, paper and pencil tests / performance tests, etc.

Elements / Components of Multimedia

The definitions of Multimedia emphasize that Multimedia consists of variety of media elements. The various Multimedia elements/components are text, graphics, animation, audio, video and interactivity. These components should be typically combined together into a project or presentation or package by using suitable authoring tools. The aspect of interactivity in Multimedia package is brought out by suitable media elements to enrich the content to be presented. As the recent definitions of Multimedia include interactivity as a component of Multimedia, it has to be properly designed. The usage and organization of media elements depends on the application and target audience.

Text

Computer generated text is one of the elements of Multimedia. Text is one of the oldest and most common medium of presenting information. It is used to communicate a concept or an idea. In any Multimedia package/ presentation, the text should effectively complement the other media elements. Important factors that influence the textual communication are typeface, font and style, text animation, special characters and hypertext. In Multimedia, text is most often used for titles, headlines, menus, navigation and content. Overcrowding of text on a single page should be avoided. It is recommended that text should be presented in combination with graphics.

According to Newby, Stephich,& Lehman (1996), text is portable; it can be used in a variety of environmental conditions (flexibility) for self-paced instruction.

Graphics

Graphics is perhaps one of the most important elements of Multimedia. Most of the Multimedia presentations are predominantly graphics based. Graphics have become an integral part of Multimedia. The richness of Multimedia and its effective communication are made possible through graphic presentations. Graphic elements in a Multimedia presentation could be still pictures (like photographs) converted to digital format with the help of scanners or generated on the computer. Graphics add colour to a presentation and act like a visual stimulator. Graphics can also be used to organize and represent data in a logical format. The two approaches in designing graphics are (i) Raster graphics and (ii) Vector graphics. The former is known as a bitmap image, which is based on a

grid of pixels and the latter is based on mathematical formulae, which is associated with 'drawing' or 'illustration'.

Common Graphic File Formats

Picture file format	Description
GIF	Graphics Interchange Format
JPEG	Joint Photo graphics Experts Group
PNG	Portable Network Graphics

Alessi, & Trollip, (2001) suggests that graphics can be used in four primary ways as listed below:

- To provide primary information
- As analogies or mnemonics
- As organizers
- As cues.

They have also provided three recommendations for appropriate use of graphics that are listed below:

(I) Graphic information design should be consistent and integrated into the rest of the instructional content.

(ii) Limit excessive detail or realism in the graphics. Excessive detail may cause memory overload in learners.

(iii) Use simple line drawings when realistic photographs contain more details than needed.

Animation

A very popular and a chief element of Multimedia presentation is animation. Animation is the technique of making sequentially placed images move in such a way that they appear to be in motion. Animation is strictly a visual illusion. It builds dynamism, energy and motion for inanimate objects. Animation is based on the concept of persistence of vision, which refers to the length of time for which the retina of a human eye is able to retain an image. Animations are created using computer graphics or images. Animation is based on arts or graphics. Animations can be classified into the following two categories:

- Two - dimensional (2-D) animations
- Three - dimensional (3-D) animations

Software used for animation determines the quality of Computer animation produced. Some very popular animation software packages are 3D Studio Max, Adobe premiere, Soft image, Macromedia flash, etc. Frequently used file formats for animation depends on the nature of software used. Some of the file formats, .dir (for Director), .fla (for flash), .max (for 3 D studio Max), .dcr (for shock wave animation file), etc.

Audio

Audio is another vital medium in a Multimedia presentation. Audio is available in different file formats and the appropriate file format is chosen to maximize its performance. Sound editors play an important role for converting file formats and for enhancing the quality of sound. In most cases, sound files are imported and edited for a Multimedia application. Audio is used in Multimedia applications to present information vocally. There may be people who prefer hearing to reading text. To cater to such an audience, narration is used to deliver information effectively. Almost all PCs today are equipped with audio devices for stereo recording and playback. Excellent compression methods such as MPEG 3 or AAC Standards are used to compress the larger audio files that enable the use of high quality audio in Multimedia based applications.

Alessi, & Trollip, (2001) state that, audio is primarily used for speech. It may also be used to demonstrate information aural in nature. Audio may also be used to learn temporal information.

Common Audio File Formats

Audio File Format	Description
WAV	Window Wave format
AIFF	Audio Interchange file format - (wave form for use on MAC)
AU	Audio format developed by SUN Microsystems
MP3	Compressed file format; using MPEG1, Audio Layer3
QT	Quick Time movies
SWA	Shock Wave Audio; compressed up to a ratio 176:1

The choice of the right Audio file format depends upon the file size, the nature of application and the operating system.

Video

Video in Multimedia is an extremely useful communication tool for presentations. It illustrates ideas and concepts besides capturing real world events. Compression methods are now easily available for the production of full screen and full motion video. The relationship between digital video and computers is the most recent additions to Multimedia technology. Video enhances, dramatizes and provides impact to the Multimedia applications. Audio and video may be used for some online mini-lectures. Both should be used minimally (Barron, (1998); Boyle, (1997); Carr-Chellman, & Duchastel, (2000).) Video Clips should be used for the purpose of identification with the instructor, and basic orientation to the relevant subject matter. Purpose of video is not to be the main source of subject context, but rather to provide student motivation to learn Alessi, &Trollip, (2001) to enhance student identification with the course, and to provide a sense of the instructor personality Carr-Chellman, & Duchastel, (2000).

Common Video File Formats

Video file formats	Description
AVI	Audio Video Interleave
MOV, MOOV, QT	Quick Time Movies Apple Macintosh native movie platform
MPEG, MPG	Motion Picture Experts Group

Interactivity

Interactivity, the mutual action between the learner, the learning system, and the learning material, adds another advantage to Multimedia: the learner controls the events delivered by the computer. The user is required to initiate, pause, or stop an action or provide feedback to demonstrate that learning has occurred. Interactivity has been found to display a positive effect on learning. People learn the material faster and have better attitudes toward the material when using an interactive program Bosco, (1986) & Fletcher, (1989, 1990). In addition, Bork, (1987) stated that interactivity enables individualization and increased motivation. Bork, E. also argued students learn more when they spend more quality time on a task. He showed that in self-reported evaluations, students consistently indicate that they stop using learning materials when the level of interaction is low. The components of interactivity are listed below:

- *Immediacy of response:* The user waits for a short waiting time for his/her input to be processed.
- *Non-sequential access to information:* Learner controls the instructional sequence, not only hyper-linked navigation but also the ability to pause the program, fast-forward video, and manipulate animation segments.
- *Adaptability:* The program response is associated with learner position or need. Examples include additional navigation suggestions, such as remedial, exploratory, or connected resources that are based on user input choices. Program adaptability might also include different testing interfaces by level of difficulty.
- *Feedback:* The program provides immediate response to an input, either in the form of a correct answer, a remedial link, or sound and animated effects logically responding to user's input.
- *Options:* The learner can access alternative paths and different difficulty levels. The input options, such as those related to voice, keyboard, or mouse, allow for a mix of learner-chosen interfaces.
- *Bidirectional communication:* Representing the highest level of interactivity, simulated dialogue between the user and the application allows for interpretation and categorization of responses and offers different levels of logical output.
- *Interrupt ability:* The learner can leave the current action by changing the learning pace or by stopping an animation sequence. The concept is strongly related to learner control, non-sequential access to information, and adaptability.

Delivery Options for Multimedia

Multimedia lessons can be delivered in multiple ways, including stand–alone CD–ROM. With the fast development of Internet and its bandwidth, it is also possible to place Multimedia lessons on the World Wide Web as a part of an e-Learning programme. Another option still available and used most effectively is to use them as supplement or complement to the printed

materials. We have two basic approaches to deliver Multimedia lessons-Independent approach and Blended-approach. Independent approach has two different modes-Web delivery and CD-delivery. The Blended approach has two strategies-Supplementary and Complementary. Let us consider each of these delivery options available to us. The CD-ROM drive has become a standard component of computers these days, and therefore it is one of the best options available. Moreover, the sizes of Multimedia lessons are normally big, and the high–density storage capacity of the CD suits the technical requirements. Since Multimedia, files are normally very big in size, they are not recommended for web-based delivery because of the poor bandwidth at the user's end. However, with the emergence of Shockwave, the delivery of Multimedia on the web has become easier. Still we cannot expect a Multimedia to be downloaded as quickly as it runs from a CD. Shockwave is a standard format for displaying media element. It is also an extension or plug–in for the browser. Essentially, it is a compression technique that allows you to play Director, Flash or Author ware files over the net.

However, if we plan to deliver Multimedia over the net, we need to do the following:

- Minimize the number of cast members
- Use low - resolution images and sound
- Use images that can be compressed
- Do not use loops continuously

A Blended strategy means that you can mix different delivery media into a package. For example, a self-learning programme can be delivered in a package of content in print, Multimedia CD and the Web versions. There are two types of Blended delivery strategy namely supplementary strategy and Complementary strategy. In a supplementary strategy, the Multimedia CD or Web version becomes supplement to the print version of learning materials. This strategy is useful if there is a need to strengthen the learning process by providing multiple points of view. On the other hand, a complementary strategy defines the limits of print medium to some areas of the content and the others for Multimedia delivery. In this way, both the media approaches become complementary to each other, forming an integrated approach.

Role of teacher in Multimedia approach

- The teacher has to make a necessary modifications and adjustments if he has to adopt Multimedia approach.
- The teacher has to be aware of different media and their availability.
- The teacher should be physically competent to use and demonstrate the use of different media.
- The teacher should be skilful enough to make a judicious choice of media and be competent enough to mix them in an orderly manner.
- The teacher's role is that of a facilitator or manager of activities. He has to lead his students for independent individualized learning.
- The teacher should provide the students with a rich learning experience that they could link practice and theory and integrate them.

Conclusion

Technology has unfurled many teaching aids in its advancements, which in its way facilitate the efficiency in learning process. One of its kinds is Multimedia which paves way for both self and interactive learning modes. This multimedia mode of teaching aid can be used to teach varieties of subjects like Language, Physical Science, Life Science, History, Geography, Mathematics etc. Institutions have to adopt technologies that will change the way students learn, communicate, produce, collaborate and study as well as improve interactions between teacher and students.

References

[1]. **Alessi, S. and Trollip, S. (2001).** *Multimedia for learning: Method and Development.* Boston: Allyn and Bacon

[2]. **Barron, A. (1998).** Designing Web-based Training. *British Journal of Educational Technology,* 29(4), 355-370.

[3]. **Bork, E. (1987).** An investigation of hypermedia. *Reading Research and Instruction,* 27(4). 5-24.

[4]. **Bosco, J. (1986).** An analysis of evaluations of interactive video. *Educational Technology,* 5, (7-17).

[5]. **Boyle, T. (1997).** *Design for Multimedia Learning*. London: Prentice Hall.

[6]. **Carr-Chellman, A. & Duchastel, P. (2000).** The Ideal Online Course. *British Journal of Educational Technology,* 31(3), (229-241).

[7]. **Computer Dictionary of Microsoft. (2002).** *Microsoft. Computer Dictionary* (5th ed.). New Delhi: Prentice Hall of India.

[8]. **Delors, J. (1996).** *Learning: The Treasure within.* Report to UNESCO of the International Commission on Education for the Twenty First Century. Paris: UNESCO.

[9]. **Fletcher, D. (1989).** The effectiveness and cost of interactive videodisc instruction. *Machine – Mediated Learning, 3,*[361-385).

[10]. **Fletcher, D. (1990).** Report No. IDA Paper P-2372. Alexandria, VA: Institute of Defence Analyses.

[11]. **Kidd, M. Hutchings, G. Hall, W. and Cesnik, B. (1992)** Applying Hypermedia to Medical Education: An Author's Perspective. *Educational Technology and Training International. 29(2),* pp.143-151.

[12]. **MHRD (1986).** *National Policy on Education*; Programme of Action, New Delhi: Ministry of Human Resource Development, (Department of Education). Government of India.

[13]. **Najjar, L. J. (1996).** Multimedia Information and Learning. *Journal of Educational Multimedia and hypermedia, 5,* (29-150).

[14]. **Nelson, T. (1965).** *The Hypertext*. Proceedings of the World Documentation Federation.

[15]. **Newby, T. J., Stephich, D., & Lehman, L. (1996).** Instructional Technology for Teaching and Learning: Design, Instruction, Integrating Computers, and Using Media. Englewood Cliffs, N.J ; Prentice Hall.

[16]. **Pandey, S. (1999).** Road Map to Quality INSET – Need Based Training. *University News, 37*(27), 13-20.

[17]. **Reddi, U. V. & Mishra, S. (2003).** *Educational Multimedia A Handbook for Teacher-Developers Version 1.1.* New Delhi: Common Wealth Educational Media Centre for Asia. 59.

[18]. **Vanaja, M. (2005).** Elements of Educational Technology (First Edition) Neelkamal Publications Pvt. Ltd. Hyderabad.